

CA20N
EV80
-1991
S71

A STUDY OF THE CONSUMPTION
PATTERNS OF GREAT LAKES
SALMON AND TROUT ANGLERS

DECEMBER 1990



Ontario

Environment
Environnement

CARON
EV80
-1991
S71

ISBN 0-7729-7428-4

A STUDY OF THE CONSUMPTION PATTERNS OF
GREAT LAKES SALMON AND TROUT ANGLERS

Report prepared by:
C. Cox and A.F. Johnson
Sport Fish Contaminant Monitoring Program
Watershed Management Section
Water Resources Branch
Ontario Ministry of the Environment


December 1990



Cette publication technique
n'est disponible qu'en anglais

Copyright: Queen's Printer for Ontario, 1991
This publication may be reproduced for non-commercial purposes
with appropriate attribution

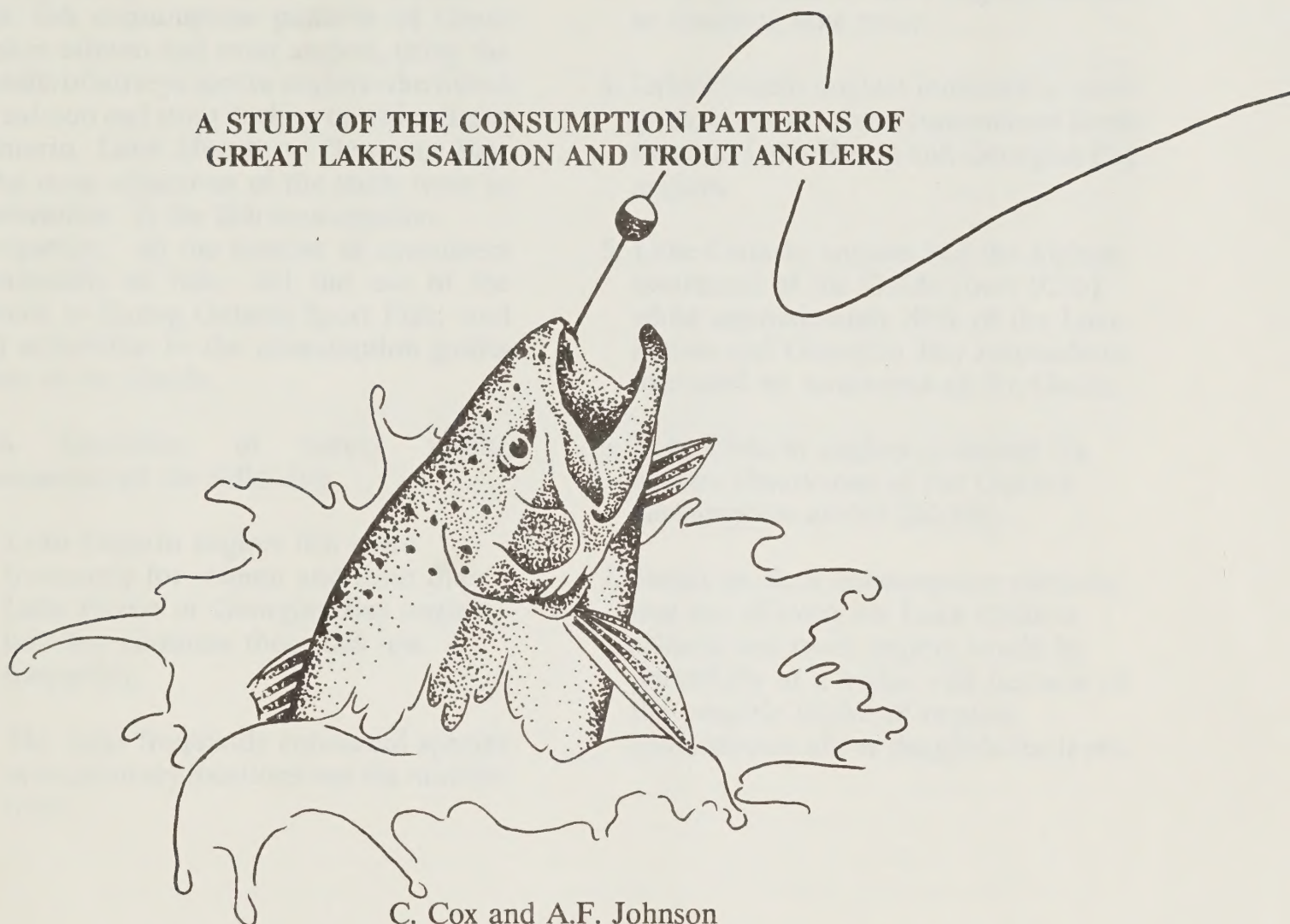
PIBS 1413
log 90-2330-091



Digitized by the Internet Archive
in 2024 with funding from
University of Toronto

<https://archive.org/details/31761119735819>

**A STUDY OF THE CONSUMPTION PATTERNS OF
GREAT LAKES SALMON AND TROUT ANGLERS**



C. Cox and A.F. Johnson
Sport Fish Contaminant Monitoring Program
Watershed Management Section
Water Resources Branch
1 St. Clair Avenue West
Toronto

December 1990

Summary

This study involved a determination of the fish consumption patterns of Great Lakes salmon and trout anglers, using the results of surveys sent to anglers who fished in salmon and trout derbies on either Lake Ontario, Lake Huron or Georgian Bay. The main objectives of the study were to determine: i) the fish consumption frequency; ii) the number of consumers potentially at risk; iii) the use of the Guide to Eating Ontario Sport Fish; and iv) adherence to the consumption guidelines in the Guide.

A tabulation of survey results demonstrated the following:

1. Lake Ontario anglers fish more frequently for salmon and trout than Lake Huron or Georgian Bay anglers, but they consume these fish less frequently.
2. The most frequently consumed species at most survey locations was the rainbow trout.
3. Very few Lake Ontario anglers fish for or consume lake trout.
4. Lake Ontario anglers indicated a much greater concern about contaminant levels than did Lake Huron and Georgian Bay anglers.
5. Lake Ontario anglers had the highest awareness of the Guide (over 92%), while approximately 85% of the Lake Huron and Georgian Bay respondents indicated an awareness of the Guide.
6. Lake Ontario anglers indicated the highest observance of the Guide's consumption advice (80.9%).
7. Based on their consumption patterns, one out of every six Lake Ontario salmon and trout anglers would be potentially at a higher risk because of the possible intake of organic contaminants above the guideline levels.

TABLE OF CONTENTS

	Page
Summary.....	i
Table of Contents.....	ii
List of Tables.....	iii
List of Figures.....	iv
Acknowledgements.....	v
1.0 INTRODUCTION.....	1
1.1 Sport Fish Contaminant Monitoring Program.....	1
1.2 Background and Purpose of the Study.....	1
1.3 Survey Format.....	2
1.4 Distribution of the Surveys.....	2
2.0 RESULTS OF THE SURVEYS.....	4
2.1 Background of the Respondents.....	4
2.2 Fishing Locations and Frequency.....	4
2.3 Species Fished For.....	5
2.4 Species Consumed.....	5
2.5 Consumption Patterns of Great Lakes Anglers.....	7
2.6 Consumers Potentially at Risk.....	9
2.7 Guide Awareness and Use.....	10
2.8 Other Locations Fished.....	10
2.9 Comments by Survey Respondents.....	11
3.0 CONCLUSIONS.....	12
4.0 REFERENCES.....	13
Appendix I M.O.E. Georgian Bay Salmon and Trout Consumption Survey.....	14
Appendix II 1989 "Guide to Eating Ontario Sport Fish" Questionnaire.....	16
Appendix III Great Lakes Locations Usually Fished by Respondents.....	18

LIST OF TABLES

	<u>Page</u>
Table 1 - Age Groupings of Respondents.....	4
Table 2 - Sex of Survey Respondents.....	4
Table 3 - Average Meal Size.....	8
Table 4 - Number of Meals/Year.....	8
Table 5 - Daily Consumption.....	8
Table 6 - Reasons for Non-Consumption.....	9
Table 7 - Lake Ontario Respondents Potentially at Risk.....	10
Table 8 - Guide Awareness by Respondents.....	10

LIST OF FIGURES

	<u>Page</u>
Figure 1 - Fishing Frequency by Great Lakes Survey Respondents.....	4
Figure 2 - Species Fished For by Great Lakes Survey Respondents.....	5
Figure 3 - Species Consumed by Great Lakes Survey Respondents.....	6
Figure 4 - Lake Trout Fished For and Consumed by Great Lakes Survey Respondents.....	6
Figure 5 - Consumption Frequency by Great Lakes Salmon and Trout Anglers.....	7
Figure 6 - Meal Size Consumed by Great Lakes Salmon and Trout Anglers.....	7
Figure 7 - Fishing Frequency for Other Locations Fished.....	11

ACKNOWLEDGEMENTS

The authors wish to acknowledge W. Scheider, J. Ralston and B. Birmingham for their critical review of the manuscript. We are also especially grateful to the following people who, through their excellent cooperation and assistance, enabled this study to be successful:

- * John Power and Mark Horsford of the "Toronto Star Great Salmon Hunt"
- * The staff at the Port Credit, Scarborough Bluffs and Oshawa weigh-in stations of the "Toronto Star Great Salmon Hunt"
- * Keith Mombourquette of the "Chantry Chinook Classic" on Lake Huron
- * Fred Gerberdt of the "Owen Sound Salmon Spectacular" on Georgian Bay
- * Arnie Clark of the Ministry of the Environment Owen Sound office
- * All the survey respondents

We also acknowledge Andre Vaillancourt of the Sport Fish Contaminant Monitoring Program, the staff of the Ministry of Natural Resources for the collection and preparation of the fish for analysis, and the Ministry of the Environment Laboratory Services Branch for their analysis of the fish samples. As well, we would like to thank Lily Lam for typing the manuscript, and Rebecca Brebner for the fine front cover art work.

1.0 INTRODUCTION

1.1 Sport Fish Contaminant Monitoring Program

The Ontario Government began monitoring contaminant levels in sport fish in the 1960's when concerns were first raised about the effects of substances such as DDT on aquatic life.

In the late 1960's, the Province of Ontario became aware of mercury contamination due to discharges from chlor-alkali (chlorine production) plants. These sources were either eliminated or severely restricted in the early 1970's, and intensive fish monitoring programs were initiated at the affected sites.

During the 1970's, studies of contaminants in Ontario sport fish were expanded to include such substances as PCBs, mirex, organochlorine pesticides and other organic chemicals.

In 1976, the Province of Ontario started the Sport Fish Contaminant Monitoring Program, to test as many angling areas as possible and assess all statistically reliable data on contaminants in Ontario sport fish. The program is a coordinated undertaking of the Ontario Ministries of Environment and Natural Resources. Advice on human health protection is provided by medical specialists in the Ministry of Labour and Health and Welfare Canada.

Sport fish are sampled by the Ministry of Natural Resources and analyzed by the Ministry of the Environment laboratories in Toronto and Thunder Bay. The test results are interpreted by the Sport Fish Contaminant Monitoring Program, and consumption advisories for Ontario anglers are developed for various sizes of each

species tested. The advice is based on federal Health and Welfare Canada guidelines for commercially marketed fish. These guidelines are incorporated into the annually updated "Guide to Eating Ontario Sport Fish", which gives consumption advice on sampled species from over 1700 of Ontario's lakes, rivers and Great Lakes locations.¹

1.2 Background and Purpose of the Study

This report discusses a study of fish consumption patterns of Great Lakes salmon and trout anglers. These anglers may potentially be at higher risk than anglers not consuming Great Lakes salmon and trout because of the potential intake of elevated levels of organic contaminants. The results of animal studies have indicated that certain organic contaminants, in particular PCBs and mirex, may potentially be carcinogenic or teratogenic (causing birth defects) to humans.² Great Lakes salmon and trout, because of their higher lipid content, accumulate organic contaminants to higher levels than other Great Lakes species. The highest organic contaminant concentrations are found in Lake Ontario salmon and trout, while much lower concentrations are found in these species from other Great Lakes. The consumption restrictions indicated in the "Guide to Eating Ontario Sport Fish" on many sizes of Lake Ontario salmon and trout are the result of levels of PCBs and mirex above the Health and Welfare guidelines of 2 ppm and 0.1 ppm respectively (mirex is currently causing the most significant restrictions and is only found in sport fish from the lower Niagara River, Lake Ontario and the St. Lawrence River).

Because of the concern for possible fetal effects, as well as possible effects on young

children, women of childbearing age and children under 15 are advised not to consume fish which are indicated in the Guide to have consumption restrictions. Adult males as well as women not in the childbearing age category are advised in the Guide to eat only one or two meals per month of sport fish which have organic contaminant levels above the federal guidelines.

As a result of these consumption restrictions, this study was designed to determine if there is a significant number of Lake Ontario salmon and trout anglers who may be at risk by consuming these fish more frequently than advised in the Guide. For Lake Huron and Georgian Bay, there are very few or no consumption restrictions for salmon and trout. Therefore, angler consumption patterns were compared between locations to determine if people consume less fish if there are consumption restrictions, and conversely, more fish if there are no consumption restrictions. Also, a comparison was made between these consumption patterns and the consumption patterns of the average Ontario angler from the Guide questionnaire results. Determinations were made about whether anglers follow the Guide consumption guidelines, especially where there are restrictions, and whether Lake Ontario anglers fish more frequently elsewhere in order to obtain fish for family consumption.

1.3 Survey Format

The three Great Lakes surveys were similar in format except for a question regarding the areas of the particular Great Lake fished. The format was multiple choice, to enable quick completion and computerization. Respondents were asked questions regarding their: background (age,

sex, residence); fishing locations and frequency; fish consumption (species, frequency, meal size, and freezing of fish for later consumption) or reasons for no consumption; use of the Guide and the consumption guidelines; and other fishing locations. As well, space was provided for respondents to write in comments. A copy of the Georgian Bay survey, as an example of the three surveys, is given in Appendix I.

The Guide survey, which is enclosed every three years in the Guide, asks a number of multiple choice questions, some of which are comparable to the Great Lakes surveys, although the Guide survey has more "Guide related" questions than the Great Lakes surveys. The consumption pattern information from the Guide survey is comparable to the other surveys, and is very useful in providing information on the average Ontario angler who fishes Great Lakes and non-Great Lakes locations. A copy of the Guide questionnaire is given in Appendix II.

1.4 Distribution of the Surveys

The first survey to be run was the Lake Ontario survey in the summer of 1988. Several relatively unsuccessful methods were tried before the most successful form of distribution was achieved. Surveys were displayed, together with pencils and a deposit box, at two popular weigh-in stations of the Toronto Star Great Salmon Hunt (Port Credit and Bluffers Park), in highly visible locations. There were a total of 161 forms taken from these two locations, but only 55 were returned. Later, another display was set up in an Oshawa sports store, which was also a Salmon Hunt weigh-in station, and 28 surveys were completed. A second and more successful method of distribution was

tried as a result of a suggestion by John Power of the Toronto Star Great Salmon Hunt. 200 surveys, together with stamped, addressed return envelopes were distributed at the closing ceremonies of the Salmon Hunt to the anglers present, and 89 anglers (44.5%) completed and returned them. However, this was still an insufficient number of responses to obtain what we considered an adequate cross-section of anglers' consumption patterns. Fortunately, a third method was suggested: the use of the Salmon Hunt entry forms to create a mailing list. Through the co-operation of the Toronto Star Great Salmon Hunt office, approximately 15-20,000 entry forms were obtained. These entry forms had the entrant's name and address as well as the size of the fish caught, and were submitted by people who caught a 10 pound or larger salmon or trout. This provided a list of the people who would have caught a fish for which there are consumption restrictions in the Guide. There were 600 different names randomly selected and these people were sent a survey together with a covering letter explaining the purpose of the survey and stressing that their names and addresses would not be used for other purposes. A total of 431 surveys were completed and returned, resulting in a very successful 71.8% return rate. This gave a total of 603 responses for the Lake Ontario survey, which provided a good data base.

For the Lake Huron and Georgian Bay surveys, derby entry forms from the Chantry Chinook Classic and the Owen Sound Salmon Spectacular respectively were randomly drawn to form mailing lists. Excellent co-operation was received from the organizers of these derbies. For the Lake Huron survey, 1000 randomly-selected names on mailing labels were received from the 1988 Chantry Chinook Classic. Surveys, together with a covering letter and

a stamped return envelope, were sent to 800 of these entrants, and 525 returns were received, representing a 65.6% response. For the Georgian Bay survey, all the 1989 Owen Sound Salmon Spectacular entry forms were obtained, and a mailing list of 700 names were sent packages similar to the Lake Huron survey. A total of 471 responses (a 67.3% return) were received, again confirming the consistent success of the method. A similar survey had been planned for a Lake Superior derby, however, there were difficulties in obtaining a mailing list, so this survey was not completed.

The 1989 Guide survey was enclosed in 100,000 of the 300,000 Guides distributed. These surveys were enclosed in Guides which were distributed to Brewers Retail and L.C.B.O. Stores throughout Ontario, to provide a good random distribution. A total of 913 responses were used to calculate the results.

2.0 RESULTS OF THE SURVEYS

2.1 Background of the Respondents

The age groupings of the respondents were similar for all three surveys, with over half the respondents being in the 26-45 age category, and over 30% in the over 45 category. The low percentages in the younger categories may be partially explained by the equipment costs involved with Great Lakes salmon and trout fishing (ie. larger boat, more expensive tackle), as opposed to the lower costs for inland fishing, which may be more suitable for younger anglers. Table 1 gives the percentage frequency of each age grouping (note: for all tables, L.O. = Lake Ontario; L.H. = Lake Huron; G.B. = Georgian Bay).

Table 1. Age Groupings of Respondents

Age Group (years)	% of Respondents		
	L.O.	L.H.	G.B.
under 15	1.1	1.7	4.5
15 - 25	8.5	4.2	9.1
26 - 45	54.6	57.6	53.4
over 45	35.8	36.5	33.0

Over 85% of the respondents in all the surveys were male (Table 2).

Table 2. Sex of Survey Respondents

Sex	% of Respondents		
	L.O.	L.H.	G.B.
Male	93.5	94.7	86.4
Female	6.5	5.3	13.6

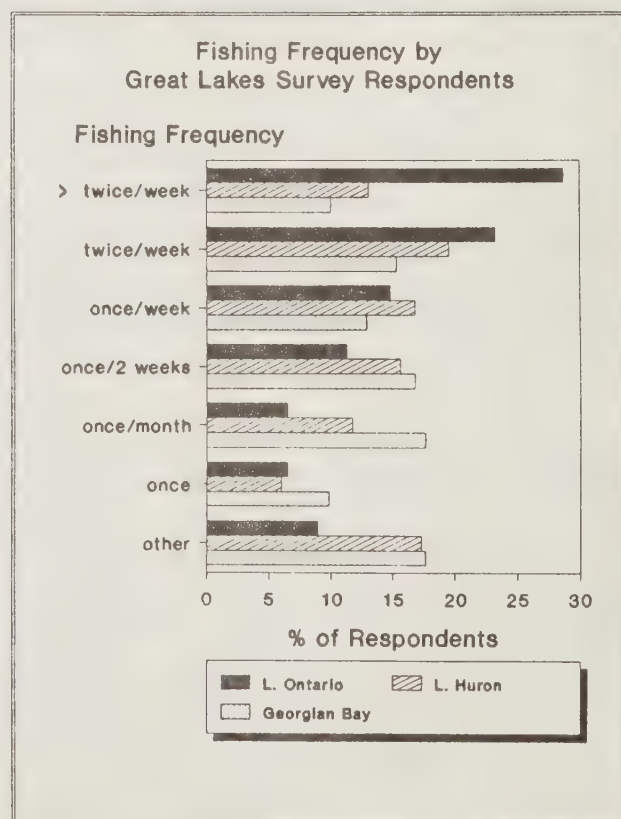
Respondents were also asked their city or town of residence, and while the majority of the respondents from each survey were from the local survey area, there were respondents from all parts of the province, some of whom may just be fishing in the derbies.

2.2 Fishing Locations and Frequency

Respondents were asked in which area(s) of the particular waterbody they usually fished for salmon and trout. The most popular areas were listed as well as an option to write in other areas. The results for each survey are listed in Appendix III.

The question was also asked how frequently respondents fished in the particular waterbody for salmon and trout between May and September. The results are shown in Figure 1 below.

Figure 1.



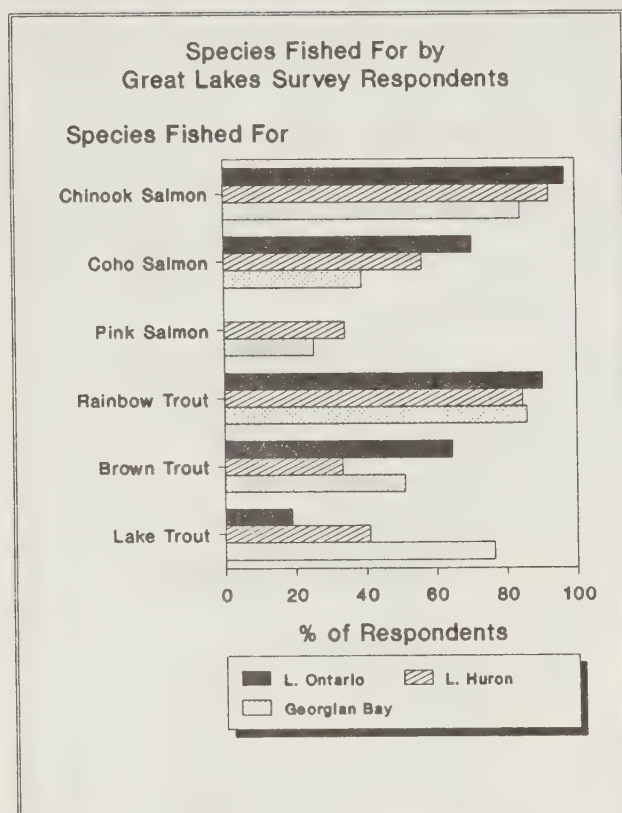
Lake Ontario anglers fished more frequently than Lake Huron or Georgian Bay anglers. This may be due in large part to the length of the Salmon Hunt, which runs through July and August to the beginning of September, and the large prize structure, with weekly prizes encouraging frequent fishing. The other two derbies run for two weeks or less, but also offer prizes which would encourage frequent fishing during that period.

2.3 Species Fished For

For these surveys, six species of salmon and trout were listed in the "species fished for" question. These species were: chinook, coho, and pink salmon, as well as rainbow, brown and lake trout (the pink salmon was not listed in the Lake Ontario survey, as it is not yet caught in large numbers). Not surprisingly, because of its large size and its status as the main derby fish, the chinook salmon was the species most frequently fished for among the salmon and trout, especially on Lake Ontario, where over 97% of the respondents fished for chinook salmon. The rainbow trout was also highly sought in all locations, and on Georgian Bay was the most popular of the salmon and trout fished for. The most significant difference between locations is for the lake trout, which is sought by less than 20% of the Lake Ontario anglers and over 75% of the Georgian Bay anglers. Lake trout from Lake Ontario, because of their slow growth rate and therefore longer exposure time, tend to have the highest organic contaminant levels of all the salmon and trout. This fact, together with the large size and good catch frequency of the Lake Ontario salmon, as well as the lack of a derby category for lake trout, may account for the relatively low percentage of Lake Ontario anglers fishing for lake trout. Figure 2 shows the species fished for

by the Great Lakes survey respondents.

Figure 2.



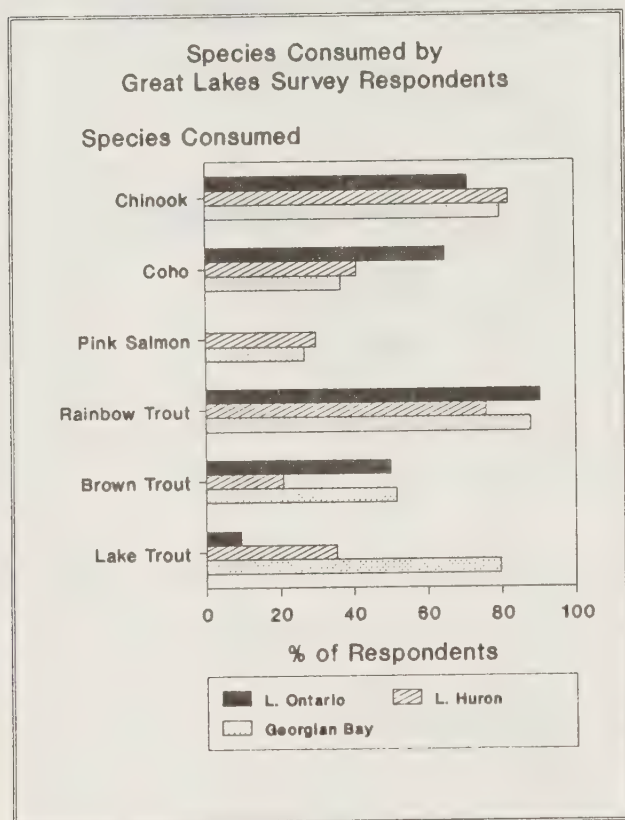
2.4 Species Consumed

The same six species for the "species fished for" question were listed as responses for the species consumed question. It is important to know the species consumed for the determination of consumption patterns and potential consumers at risk. For example, the sizes of Lake Ontario rainbow trout in the unlimited consumption category are much larger than the sizes of the other salmon and trout for this category. Therefore some sizes of this species may be consumed at a frequency greater than once or twice per month, and may also be consumed by women of childbearing age and children under 15 years.

Interestingly enough, after the people not consuming any Great Lakes salmon and

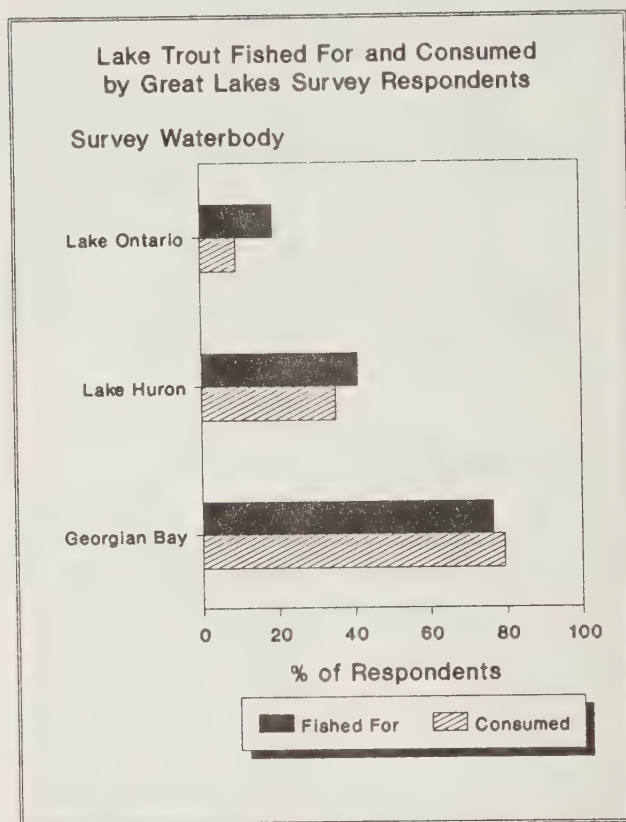
trout are factored out, the rainbow trout was the most frequently consumed species by both Lake Ontario and Georgian Bay anglers, and was second to the chinook salmon for Lake Huron anglers (Figure 3).

Figure 3.



Only 9.4% of the Lake Ontario anglers who consume salmon/trout consume lake trout which, as previously mentioned, usually have the highest organic contaminant levels of all the salmon and trout. Anglers have been made aware of this information through the Guide, and there is an obvious recognition of the need to restrict consumption of lake trout. On Georgian Bay, where lake trout consumption is not restricted by the presence of contaminants, 79.5% of the respondents consume this species. Figure 4 shows a comparison of the percentage of lake trout fished for and consumed by respondents to the three surveys.

Figure 4.

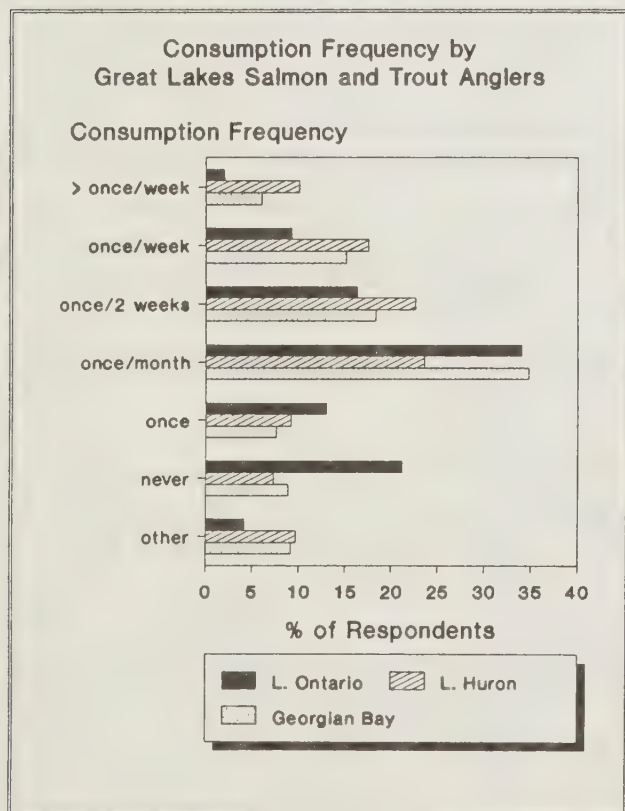


As well, the increasing popularity of salmon consumption is indicated by the results of the 1989 Guide survey, where chinook and coho salmon were the ninth and tenth most frequently caught and consumed sport fish species.³ These Guide surveys are done every three years and in previous surveys, the salmon were much lower on the frequency list. This increase in salmon fishing is probably due to the increasing number of salmon derbies and the prizes offered in the derbies, as well as the increasing popularity of fishing on Lake Huron/Georgian Bay (based on Guide survey results), where the salmon are not restricted for consumption.

2.5 Consumption Patterns of Great Lakes Anglers

One of the main objectives of this study was to determine if anglers consume less fish where there are recommended consumption restrictions. This was verified when the results of the survey question that addressed Lake Ontario anglers' consumption frequency and meal size consumed for salmon and trout were compared to the results for Lake Huron and Georgian Bay anglers. Compared to the other survey respondents, almost three times as many Lake Ontario anglers did not consume any salmon or trout (21.2%, as compared to 7.3% and 8.9% for Lake Huron and Georgian Bay anglers respectively). This is also much more frequent than the 8.4% of the Guide survey respondents who never eat any fish. Figure 5, which compares the salmon and trout

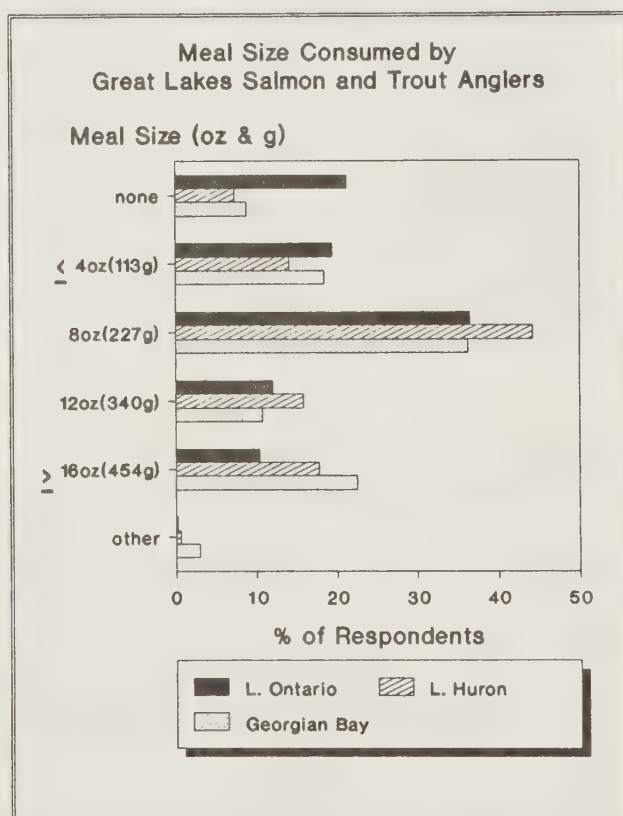
Figure 5.



consumption frequencies between the three Great Lakes surveys, shows that Lake Huron anglers consume these fish most frequently, followed by Georgian Bay anglers, and finally the Lake Ontario anglers. The most frequent consumption frequency for all three surveys (and the Guide survey) was once/month. Over one-third of the Lake Ontario and Georgian Bay respondents consumed salmon and trout at this frequency.

A comparison of the meal size consumed by the various survey respondents shows that Lake Ontario anglers consume smaller amounts of salmon and trout than the other anglers (Figure 6).

Figure 6.



The most frequent meal size for all surveys, including the Guide survey, was 8 oz (227 g). Lake Huron and Georgian Bay anglers consumed an almost identical average meal size, which was larger than

that consumed by the Lake Ontario and Guide anglers (Table 3).

Table 3. Average Meal Size

<u>Survey</u>	<u>Average Meal Size</u>	
	<u>ounces</u>	<u>grams</u>
Lake Ontario	8.69	246
Lake Huron	9.92	281
Georgian Bay	9.90	281
Guide	7.89	224

Table 4 shows the number of meals consumed/year, and this again confirms the lower consumption pattern of Lake Ontario anglers.

Table 4. Number of Meals/Year

<u>Survey</u>	<u>Meals/year</u>
Lake Ontario	21.1
Lake Huron	33.9
Georgian Bay	27.0
Guide	31.2

A daily consumption figure (derived from the mean meal size and meal frequency) provides an interesting comparison between the various surveys and can be used in the determination of contaminant intake levels. Table 5 shows these daily consumption figures, and the Lake Ontario value is well below the values for the other surveys. The Lake Huron respondents' daily consumption is almost twice that of the Lake Ontario respondents. As well, the salmon and trout consumption by Lake Huron and Georgian Bay respondents is higher than the total sport fish consumption from a variety of species by the average Ontario angler.

Table 5. Daily Consumption

<u>Survey</u>	<u>Daily Consumption</u>	
	<u>ounces</u>	<u>grams</u>
Lake Ontario	0.50	14.24
Lake Huron	0.92	26.10
Georgian Bay	0.73	20.70
Guide	0.68	19.14

Great Lakes respondents were asked if they would freeze salmon and trout for later consumption, and a much higher percentage of the Lake Huron and Georgian Bay respondents (91.3% and 88.8% respectively) than the Lake Ontario respondents (62.4%) indicated that they would freeze these species.

Respondents were also asked if they would keep lake trout for consumption if they caught this species. Lake trout, as previously discussed, normally have the highest organic contaminant levels and all but the smallest sizes are restricted for consumption in Lake Ontario. However, lake trout are not restricted for consumption in Lake Huron and Georgian Bay. Survey respondents indicated an awareness of Guide information as only 13.9% of the Lake Ontario respondents would keep a lake trout, while 94.4% and 93.5% of the Lake Huron and Georgian Bay respondents respectively would keep a lake trout.

Another interesting comparison between surveys occurs as a result of responses to the question regarding reasons for not consuming salmon and trout. Three responses were offered in the questionnaire, as well as another column to write-in responses. The "only fishing for the sport" and "trying to catch fish to enter the Derby" responses were frequent in all surveys. However, over two-thirds of the Lake Ontario respondents who didn't

consume salmon and trout indicated a concern about the contaminant levels. This may or may not indicate a knowledge of the Guide information, but it does indicate that contaminant levels in Lake Ontario salmon and trout are a concern among the angling population. The "I'm concerned about contaminants" response was only given by 10-12% of the respondents to the other two surveys. Table 6 gives the various percentage responses. Note that the values do not total 100%, as more than one response could be given (the percentage of respondents not consuming salmon and trout was 21.2%, 7.3%, and 8.9% for Lake Ontario, Lake Huron and Georgian Bay anglers respectively).

Table 6. Reasons for Non-Consumption

Reason	% of Respondents		
	L.O.	L.H.	G.B.
Fishing for sport	45.7	36.8	45.2
Derby fishing	26.0	31.6	19.0
Concerned about contaminants	67.7	10.5	11.9
Didn't catch any	0.7	52.6	33.3
Other	7.9	44.7	4.8

2.6 Consumers Potentially at Risk

As mentioned in the introduction, there are potential health effects which could be caused by consuming salmon and trout (with organic contaminant levels above the federal Health and Welfare Canada guidelines) more frequently than the consumption advice suggests. For this study, consumption frequency would only involve Lake Ontario salmon and trout consumers who could be intaking higher amounts of organic contaminants, especially PCBs and mirex.

In the case of potential carcinogens such

as PCBs and mirex, exposure guidelines are typically developed using conservative health-based risk assessment principles. Such principles result in the calculation of exposure limits that are associated with a negligible lifetime cancer risk and are considered to be protective of public health.²

The guideline for consumption of sport fish which contain elevated levels of organic contaminants is one or two meals/month for adult males, and no consumption for children under 15 and women of childbearing age (ie. pregnant women, women intending to become pregnant and breastfeeding mothers). A meal is considered to be 8 ounces (230 grams). Therefore, those respondents potentially at risk would be: i) children under 15 years and women of childbearing age (15-45 years), who consume any restricted Lake Ontario salmon and trout ii) all others consuming more than the guideline suggests. Table 7 shows the maximum number of Lake Ontario respondents who could be deemed at risk if they consumed only larger Lake Ontario salmon and trout. However, some of these respondents indicated that they are consuming only smaller fish (especially rainbow trout up to possibly 65 centimetres (26 inches)) which are not in the restricted consumption category.

The results indicate that 15.4% of the female respondents and 16.7% of the male respondents would potentially be at an increased risk due to their Lake Ontario salmon and trout consumption habits. The combined percentage of 16.6% indicates that approximately one out of every six Lake Ontario respondents is either unaware of the Lake Ontario contaminant levels or is choosing to ignore the guidelines. This justifies continued efforts to increase the awareness of the Lake

Table 7. Lake Ontario Respondents Potentially at Risk

<u>Age Group</u> <u>(years)</u>	<u>No. of Respondents</u>	
	<u>Females</u> (/39)	<u>Males</u> (/564)
under 15	-	4
15-25	-	6
26-45	2	42
over 45	4	42
Total	6	94

Ontario anglers through the annual Guide and the Lake Ontario consumption guidelines.

2.7 Guide Awareness and Use

Another important aspect of this study was to determine angler awareness of the Guide and whether anglers are following consumption guidelines in the Guide. Respondents were asked: if they were aware of the Guide and had a copy; if they were aware but did not have a copy; or if they were not aware of the Guide. Lake Ontario respondents had the highest Guide awareness, with over two-thirds of the respondents having a copy of the Guide and only 7.5% not aware of the Guide. It is important that as many Lake Ontario anglers as possible be aware of the Lake Ontario guidelines as a possible health protection measure. The Guide awareness by Lake Huron and Georgian Bay respondents is approximately 85% for each survey. This is excellent considering the relatively few consumption restrictions and the fact that some communities promote the "you can eat what you catch" idea, which may lead anglers to believe that a Guide is not necessary for fishing on that waterbody. Table 8 gives the percentage responses for all three surveys.

Table 8. Guide Awareness by Respondents

<u>Awareness</u>	<u>% of Respondents</u>		
	<u>L.O.</u>	<u>L.H.</u>	<u>G.B.</u>
aware/have a Guide	67.8	50.7	61.4
aware/no Guide	24.7	34.5	24.1
not aware	7.5	14.8	14.5

Respondents who used the Guide were asked if they followed the guidelines for the salmon and trout, and not surprisingly, the Lake Ontario respondents indicated the highest guideline observance as 80.9% responded positively. This again indicates an awareness of the contaminant levels in Lake Ontario salmon and trout. For the Lake Huron and Georgian Bay surveys, the guidelines were being followed by 70.5% and 68.1% of the respondents respectively.

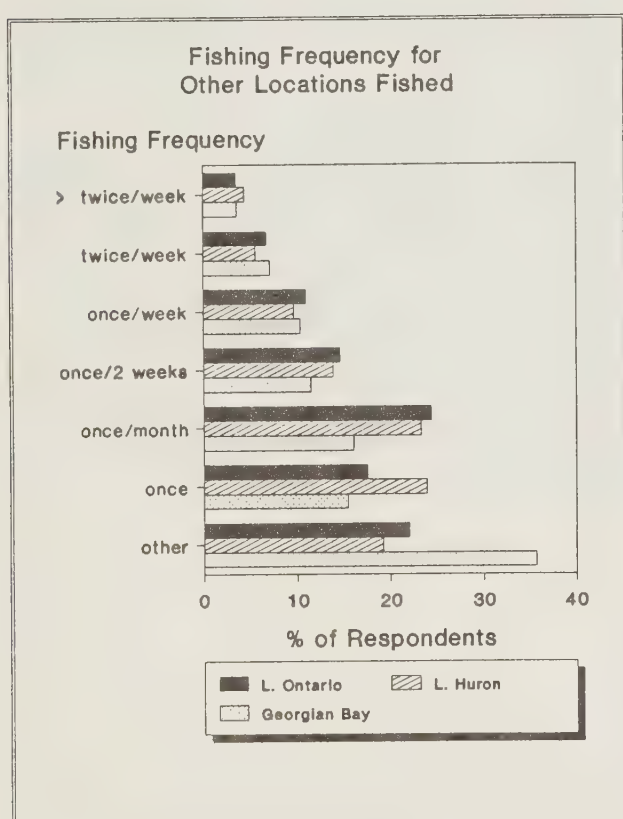
Respondents who had a Guide were asked if they also had used the Guide in previous years. The highest percentage of previous Guide use was by the Lake Ontario respondents, two-thirds of whom indicated a positive response. This is somewhat higher than the Lake Huron and Georgian Bay survey responses of 49% and 56% respectively, but not as high as the 73% response by the 1989 Guide survey respondents.

2.8 Other Locations Fished

Respondents were asked if they fished at other locations, in order to determine if their fishing efforts, and therefore fish consumption, were concentrated on Great Lakes salmon and trout. A very high percentage of all the respondents did fish other locations, and the majority of these other locations were inland locations. Almost all (92%) of the Lake Ontario respondents also fished other locations.

Less of the respondents fishing Lake Huron and Georgian Bay (71% and 81% respectively) also fished other locations. It is noteworthy that 42% of the Lake Ontario respondents also fished Lake Huron/Georgian Bay. Many of these anglers could be trying for salmon and trout which are not restricted for consumption. Conversely, 19% of the Lake Huron and 30% of the Georgian Bay respondents also fished Lake Ontario. Figure 7 shows the fishing frequencies at the other locations by the survey respondents.

Figure 7.



The respondents generally fished these other locations much less frequently than they fished Great Lakes locations for salmon and trout. The most frequent responses were once a month and once a year, and the results were quite similar for all three surveys.

2.9 Comments by Survey Respondents

Respondents were given the opportunity to write in any comments in space provided at the end of the survey. The majority of the respondents did provide comments on a variety of subjects, but there were certain frequently mentioned comments for each survey.

Lake Ontario survey respondents were generally concerned with the contaminant levels in the salmon and trout and how levels restrict the consumption. There were very few complaints regarding the fishing quality, except for some criticism of the lake trout. A number of people commented on the Guide and the Toronto Star Great Salmon Hunt.

The comments by Lake Huron survey respondents centered around three major concerns: stocking, lamprey, and commercial fishing. With regard to stocking, there were a number of complaints regarding the supposed lack of stocking on Lake Huron, as well as a resentment towards the Lake Ontario fishery. Many anglers were not satisfied with the fishing quality. The frequency of lamprey/lamprey marks on the salmon and trout was an extremely common complaint and action was demanded by a number of the respondents. Commercial fishing on Lake Huron was also the source of much criticism and concerns were given that this was a cause of poorer fishing.

Georgian Bay anglers had fewer complaints about the fishing quality than Lake Huron anglers and many seemed to be satisfied with the fishing potential. A number of respondents remarked about the clean water and the safety of the fish for family consumption. Anglers appeared to be quite satisfied with the stocking program. The lamprey was also a concern,

but was not as frequently mentioned as in the Lake Huron survey.

Copies of the comments have been sent to appropriate Ministry of Natural Resources personnel and to the various derby organizers. John Power discussed the Lake Ontario comments in his outdoor column, with a request for public feedback regarding raising the minimum entry size for salmon and trout caught in the Salmon Hunt, as suggested by some of the respondents. Thus the comments of the respondents are being seen by responsible people, and changes may result from this feedback.

3.0 CONCLUSIONS

As a result of the excellent response rate to the surveys, the objectives set out in the purpose of this study were achieved.

Where there were consumption restrictions on the salmon and trout (ie. Lake Ontario), anglers consumed less of these species than did anglers fishing Lake Huron and Georgian Bay where there are few or no restrictions. This pattern, together with the indicated observance of the Guide consumption guidelines by the majority of the respondents, shows the effectiveness of the Guide in communicating contaminant information to anglers and fish consumers. The Guide has been published since 1978 and from the use and awareness responses, has obviously become well-known to Great Lakes anglers, especially Lake Ontario anglers.

An understanding by Lake Ontario anglers of the contaminant problems in salmon and trout is indicated not only by their lower consumption rates, but also by their species preferences for consumption

- ie. very few lake trout (generally the highest in contaminant levels of the salmon and trout) and a preference for rainbow trout (which is not restricted at smaller sizes).

However, based on the consumption patterns, approximately one in every six Lake Ontario anglers would be considered to be at a higher risk because of increased contaminant intake, and there is therefore a continuing need to educate the Lake Ontario anglers and fish consumers through the Guide and the Sport Fish Contaminant Monitoring Program.

Great Lakes anglers indicated specific concerns about the fishing quality (eg. Lake Ontario anglers had concerns about contaminant levels and Lake Huron anglers had concerns about lampreys and stocking), and these concerns need to be addressed by the appropriate agencies. For Lake Ontario, a reduction in organic contaminant levels (especially mirex) is necessary so that anglers can enjoy unrestricted consumption of salmon and trout as is available on Lake Huron and Georgian Bay.

4.0 REFERENCES

1. Ontario Ministry of the Environment. 1990. **Guide to Eating Ontario Sport Fish**. Toronto.
2. Birmingham, B. (pers. comm.) Ontario Ministry of the Environment. Hazardous Contaminants Branch. 2 St. Clair Ave. W. Toronto.
3. Cox, C., A. Vaillancourt, and A.F. Johnson. 1990. **The Results of the 1989 "Guide to Eating Ontario Sport Fish" Questionnaire**. Ontario Ministry of the Environment. Toronto.

Appendix I

M.O.E. Georgian Bay Salmon and Trout Consumption Survey

The Ministry of the Environment Sport Fish Contaminant Monitoring Program would appreciate your co-operation in completing this consumption survey which is based on your 1989 salmon and trout fishing on Georgian Bay. Your answers will enable us to improve the effectiveness of the Program. Please mail the completed survey in the enclosed stamped envelope.

1. What is your age? ☐ Under 15 years ☐ 15-25 years
 ☐ 26-45 years ☐ Over 45 years
2. What is your sex? ☐ Male ☐ Female
3. Name of City or Town of Residence: _____
- 4.(a) In which area(s) of Georgian Bay do you usually fish for salmon and trout?

☐ Owen Sound Bay ☐ Colpoys Bay
☐ Tobermory to Cape Croker area ☐ Severn Sound area
☐ Nottawasaga Bay
☐ Other: _____
- (b) Do you also fish Lake Huron for salmon and trout?
 ☐ No ☐ Yes
- (c) If yes, in which area(s) do you usually fish?

☐ Point Edward to Grand Bend ☐ Goderich area
☐ Kincardine area ☐ Fishing Islands
☐ Port Elgin, Southampton, Sauble Beach
☐ Other: _____
5. How often between May and September do you fish Georgian Bay for salmon and trout?

☐ Daily ☐ 3-6 times a week ☐ Twice a week
☐ Once a week ☐ Once every 2 weeks ☐ Once a month
☐ Once only ☐ Other: _____ times
6. Which species do you fish for? (more than one can be checked)

☐ Chinook ☐ Coho ☐ Pink Salmon
☐ Rainbow Trout ☐ Brown Trout ☐ Lake Trout/Splake
7. Which species do you keep to eat? (more than one can be checked)

☐ Chinook ☐ Coho ☐ Pink Salmon
☐ Rainbow Trout ☐ Brown Trout ☐ Lake Trout/Splake
8. How often do you eat Georgian Bay salmon and trout caught by angling between May and September?

☐ Daily ☐ 3-6 times a week ☐ Twice a week
☐ Once a week ☐ Once every 2 weeks ☐ Once a month
☐ Once only ☐ Never
☐ Other: _____ times

(over)

9. How much Georgian Bay salmon or trout do you eat at a single meal?

- ☐ None ☐ Less than 4 oz.(113g) ☐ 4 oz.(113g)
☐ 8 oz.(227g) ☐ 12 oz.(340g) ☐ 1 lb.(454g)
☐ More than 1 lb.(454g) ☐ Other:____ oz.

10. Would you freeze Georgian Bay salmon and trout for later consumption after the fishing season? ☐ Yes ☐ No

11.If you do not consume Georgian Bay salmon and trout, what is the reason?

- ☐ I'm only fishing for the sport
☐ I'm only trying to catch fish to enter in the Derby
☐ I'm concerned about the contaminant levels
☐ Other:_____

12.If you caught a Georgian Bay lake trout/splake, would you keep it for consumption? ☐ Yes ☐ No

13.Which of the following statements about the "Guide to Eating Ontario Sport Fish" applies to you?

- ☐ I am aware of the "Guide" and I have a copy (1989 or before)
☐ I am aware of the "Guide" but I do not have a copy
☐ I am not aware of the "Guide"

14.If you use the "Guide", do you follow the consumption guidelines for Georgian Bay salmon and trout?
☐ Yes ☐ No

15.Have you obtained and used the "Guide" in previous years? (before 1989) ☐ Yes ☐ No

16.(a) Do you also fish in lakes/rivers other than Georgian Bay?
☐ Yes ☐ No

(b) If Yes, please indicate where you fish:

- ☐ Lake Erie ☐ Lake Ontario ☐ Lake Superior
☐ Inland lakes/rivers (please list the most frequently fished water body): _____

(c) If Yes, how frequently do you fish these other locations?

- ☐ Daily ☐ 3-6 times a week ☐ Twice a week
☐ Once a week ☐ Once every 2 weeks ☐ Once a month
☐ Once a year ☐ Other:_____times


Thank you for taking the time to assist us in this survey. If you have any comments, we would appreciate them.

Appendix II

1989 Guide to Eating Ontario Sport Fish Questionnaire

The Ministry of the Environment sport fish contaminant monitoring program would appreciate your co-operation in completing and returning this postage-free questionnaire. Your answers and comments will help us to improve the guide and the effectiveness of the program.

1. What is your age? Under 15 years 15-25 years 26-45 years over 45 years
2. What is your sex? Male Female
3. Are you a resident of: Southern Ontario Northern Ontario Another province The U.S.A.
4. Where did you obtain your 1989 guide?
Brewer's Retail store By mail from a govt office
L.C.B.O. store At a govt office
From a friend or relative Other: _____
5. How did you first become aware of the guide?
Saw it on display Newspaper, radio or TV story
Advertisement Told by friend or relative
Told by govt official Other: _____
6. Have you obtained and used the guide in previous years?
No Yes If yes, in which year(s)?
1988 1987 1986 Before 1986
7. How often did you go fishing in Ontario throughout 1988?
On vacation only (___times) Once a month
Daily Once every 4 months
More than once a week Once
Once a week Never
Once every two weeks ___times
Other: _____
8. What lakes and rivers in Ontario did you fish in 1988?
(a) Lakes Balsam Nipissing Scugog
Buckhorn Ontario Simcoe
Erie Pigeon Stony
Huron/ Rice Sturgeon
Georgian Bay St. Clair Superior
Other: your most frequently fished lake, if none of the above _____
- (b) Rivers Credit Niagara St. Lawrence
French Nottawasaga Saugeen
Ganaraska Ottawa Thames
Grand Rideau Trent
Other: your most frequently fished river, if none of the above _____
9. What species of fish did you keep to eat in 1988?
Brook Trout Crappie Smallmouth Bass
Brown Bullhead Lake Trout Smelt
Brown Trout Largemouth Bass Splake
Carp Muskie Sunfish
Catfish Northern Pike Walleye (Pickerel)
Chinook Salmon Pink Salmon Whitefish
Cisco (Herring) Rainbow Trout White Sucker
Coho Salmon Rock Bass Yellow Perch
Other: _____
Did not keep fish to eat
10. How often did you eat these fish in 1988?
On vacation only (___times) Once a month
Daily Once every 4 months
More than once a week Once
Once a week Never
Once every two weeks ___times
Other: _____

11. How much fish caught by angling from Ontario waters do you eat at a single meal?
- | | | |
|---------------------|------------|----------------------|
| None | 110g (4oz) | 340g (12oz) |
| Less than 60g (2oz) | 170g (6oz) | 450g (1lb) |
| 60g (2oz) | 230g (8oz) | More than 450g (1lb) |
12. a) How often do you eat fish (freshwater or saltwater) purchased from a store?
- | | |
|-----------------------|---------------------|
| Daily | Once every 4 months |
| More than once a week | Once |
| Once a week | Never |
| Once every two weeks | Other: _____times |
- b) If you purchase fish from a store, please indicate which fish you would normally purchase to consume?
- | | | |
|-----------------|---------------|--------------|
| Boston Bluefish | Ocean Perch | Tuna |
| Cod | Rainbow Trout | Turbot |
| Haddock | Salmon | Walleye |
| Halibut | Smelt | Whitefish |
| Lake Trout | Sole | Yellow Perch |
13. How much fish purchased from a store do you eat at a single meal?
- | | | |
|---------------------|------------|----------------------|
| None | 110g (4oz) | 340g (12oz) |
| Less than 60g (2oz) | 170g (6oz) | 450g (1lb) |
| 60g (2oz) | 230g (8oz) | More than 450g (1lb) |
14. a) When you catch a fish you wish to keep, do you check the guide for consumption advice?
- | | |
|-----|----|
| Yes | No |
|-----|----|
- b) If the consumption advice for your catch is not in the  category, do you follow this advice?
- | | |
|-----|----|
| Yes | No |
|-----|----|
15. Has the information in this guide led to a change in your fishing and/or fish-consuming habits?
- | | |
|-----|----|
| Yes | No |
|-----|----|
- If Yes, in what way(s)?
- | | |
|---------------------------------------|---------------------------|
| Awareness of fish contaminant problem | Eat more fish |
| Eat less fish | Stopped eating fish |
| Eat fish within guidelines | Changed fishing locations |
| Return larger fish | Other _____ |
- If No, why not?
- | | |
|----------------------------------|---|
| Don't eat fish | Fish caught are in the unlimited consumption category |
| Don't catch or eat enough fish | |
| Areas fished not listed in guide | |
| Other _____ | |
16. a) Did the information provided in this guide meet your needs?
- | | | |
|-----|----|-----------------|
| Yes | No | If No, why not? |
|-----|----|-----------------|
- b) Did it list the lakes and rivers you were interested in?
- | | | | |
|-----|------|------|------|
| All | Most | Some | None |
|-----|------|------|------|
- c) Could you suggest additional lakes and rivers to be tested?
- _____
17. Do you find the revised information at the beginning of the guide useful and informative?
- | | | |
|-----|----|----------------|
| Yes | No | Didn't read it |
|-----|----|----------------|
18. In your opinion, in what way could this guide be improved?
- _____
- _____
19. Other comments you may have on this program and/or publication.
- _____
- _____
- _____

Thank you for taking the time to assist us.

Appendix III

Great Lakes Locations Usually Fished by Respondents

1. Lake Ontario

<u>Location</u>	<u>% of Respondents</u>
Port Credit	39.5
Scarborough Bluffs	33.7
Bronte Creek	18.2
Oshawa	11.8
Other	39.9

2(a) Lake Huron

<u>Location</u>	<u>% of Respondents</u>
Port Elgin, Southampton, Sauble Beach	72.0
Fishing Islands	7.8
Goderich	6.7
Point Edward to Grand Bend	5.1
Other	29.7

2(b) Georgian Bay Locations Fished by Lake Huron Anglers

<u>Location</u>	<u>% of Lake Huron Respondents</u>
Owen Sound Bay	45.0
Colpoys Bay	23.4
Nottawasaga Bay	6.1
Other	1.5

3(a) Georgian Bay

<u>Location</u>	<u>% of Respondents</u>
Owen Sound Bay	91.7
Colpoys Bay	25.9
Nottawasaga Bay	10.0
Tobermory to Cape Croker	3.8
Severn Sound	1.7
Other	3.0

3(b) Lake Huron Locations Fished by
Georgian Bay Anglers*

<u>Location</u>	<u>% of Respondents</u>
Port Elgin, Southampton, Sauble Beach	79.2
Kincardine	27.7
Goderich	11.7
Fishing Islands	9.1
Point Edward to Grand Bend	6.4
Other	6.4

* These figures are based on 56.8% of the Georgian Bay respondents, who indicated they also fished Lake Huron.

